ABSTRACT OF THE DISCLOSURE

An optical-path-superposing-and-separating unit superposes optical paths of two inputted signal lights with each other, and then separate them. A non-linear waveguide is arranged in an area where the optical paths are superposed with each other. First and second optical waveguide are connected to the optical path superposing-and-separating unit. The second optical waveguide has a longer optical path than the first optical waveguide. A control light is introduced to the non-linear waveguide. An interference separator distributes the inputted two signal lights depending on a phase difference therebetween. Third and fourth optical waveguides connect the optical-path-superposing-and-separating unit to the interference separator. Optical path lengths of the third and fourth optical waveguides are set such that a delay time of the signal light propagating through the second optical waveguide relative to the signal light propagating through the first optical waveguide is canceled at time when the two signal lights reach the interference separator.